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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
SNELTING, ERIN LYNN	
ART UNIT	PAPER NUMBER
1741	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/560,023	KIM ET AL.	
	Examiner	Art Unit	
	Erin Snelting	1741	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 06-23-2011 has been entered. Claims 11 and 14 are amended, claims 1-10 are cancelled, and new claims 15-21 are offered for consideration.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 11-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 11 at line 7 recites that the silica gel pellets are heated "from ambient temperature". Applicant's specification does not recite

any particular starting temperature of the silica gel pellets, and never particularly recites "ambient temperature", or any analogous language such as "room temperature".

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 11-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. Claim 11 at line 7 recites that that the silica gel pellets are heated "from ambient temperature". As the specification does not recite "ambient temperature" (see above), it is unclear what temperatures fall within the metes and bounds of the claim. There are a large number of standard temperature conditions utilized by various organizations around the world. This language also leads to particular confusion regarding claim 12. If a standard ambient temperature is considered to be 25°C, then to reach the minimum temperature of 1050°C at the fastest ramp rate of 70°C, the minimum value of $n/2$ is 14.6 minutes ((1050-25)/70=14.6). Thus, the minimum value of n for the conditions claimed is 29.3 minutes. It is unclear, then, how one would carry out the method of claim 11 for n equaling 20 minutes to 29.3 minutes, as encompassed by claim 12. For n to equal 20 minutes under the claimed conditions, ambient temperature would have to be 350°C at minimum, which is well above most temperatures considered to be "ambient" by those of ordinary skill in the art.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto '156 (US 3,867,156) in view of Fisher '347 (US 2,883,347) and Fukumoto '486 (US 3,717,486).

10. Regarding claims 15 and 16, Fukumoto '156 teaches:

a. placing a plurality of silica gel pellets (column 3, lines 58-61) in a rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36)

b. the temperature of the rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36) being between about 1050°C and about 1200°C (column 3, lines 62-64 - the temperature range of Fukumoto '156 overlaps the claimed, see In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976))

c. holding the silica gel pellets in the rotary tube furnace for a predetermined time while the temperature remains between about 1050°C and about 1200°C (column 4, lines 48-50).

Fukumoto '156 is silent regarding increasing the temperature in the rotary tube furnace at a specific rate. In analogous art of silica gel processing, Fisher '347 teaches controlling a rate of temperature increase in treating silica gel to not be too high in order to control the burning out of organic substances and prevent contamination of the silica product (column 6, lines 8-15). Also in analogous art of silica gel processing, Fukumoto '486 teaches controlling a rate of temperature increase in treating silica gel to not be too low in order to maintain strength of the silica product (column 3, line 66-column 4, line 14). Thus, Fisher '347 and Fukumoto '486 suggest that a rate of increasing temperature in treating silica gel is a result effective variable because it may be optimized in order to prevent contamination and maintain strength of the silica product. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. Please see In re Boesch, 617 F.2d 272, 205 USPQ (CCPA 1980). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Fukumoto '156 by controlling the temperature of the rotary tube furnace to optimize the rate of temperature increase, as suggested by Fisher '347 and Fukumoto '486 for the benefit of preventing contamination and maintaining strength of the silica product.

11. Regarding claim 17, Fukumoto '156 is silent regarding the silica gel pellets having pores with a size of about 20-70 angstroms, and a pore volume of around 0.3 to

1.1 mL/g. However, Fukumoto '156 suggests that the physical properties of the gel may be selected, along with processing conditions, based on the desired properties of the product (column 3, lines 56-61; column 4, line 57-column 5, line 6). Fukumoto '486 also suggests that the physical properties of the gel may be selected in order to optimize foaming and based on the desired properties of the end product (column 3, lines 3-42). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Fukumoto '156, Fisher '347, and Fukumoto '486 by selecting pore size and pore volume of the silica gel pellets for the benefit of optimizing foaming and properties of the end product.

12. Regarding claim 18, Fukumoto '156 teaches holding the silica gel pellets in the rotary tube furnace while the temperature remains between about 1050°C and 1200°C as described for claim 15 above. Fukumoto '156 is silent regarding a specific filling density of the porous silica sphere. However, Fukumoto '156 does teach the temperature is maintained (column 4, lines 48-50) until the porous silica sphere has desired physical properties including sphere size, microstructure, porosity, bulk density, and specific surface area (column 4, line 53-column 5, line 33). All of these properties are correlated to filling density, and thus Fukumoto '156 suggests that the time and temperature ("foaming conditions", column 4, lines 59-60; column 4, lines 21-52) may be selected by one of ordinary skill in the art in order to achieve desired physical properties of the porous silica sphere including filling density.

13. Claims 14 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukumoto '156 (US 3,867,156) in view of Fukumoto '486 (US 3,717,486) and Dobson '988 (US 4,392,988).

14. Regarding claim 19, Fukumoto '156 teaches:

a. placing a plurality of silica gel pellets (column 3, lines 58-61) in a rotary tube furnace (column 7, lines 17-19; column 8, lines 35-36)

b. treating the silica gel pellets at a temperature between about 400°C and about 900°C (column 3, lines 62-67)

c. treating the silica gel pellets at a temperature between about 1050°C and about 1200° C (column 3, line 62-column 4, line 1)

wherein the temperature ranges of Fukumoto '156 overlap the claimed ranges. See In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976). Fukumoto '156 is silent regarding the heat treating occurring in a first rotary tube furnace and a second rotary tube furnace or the temperature increase rate in the first rotary tube furnace being between about 35-70°C min^{-1}. In analogous art of silica gel processing, Fisher '347 teaches that speed of temperature increasing is a result effective variable because it may be altered in order to control the burning out of organic substances and prevent contamination of the silica product (column 6, lines 8-15). Please see In re Boesch, 617 F.2d 272, 205 USPQ (CCPA 1980). In analogous art of forming porous ceramic spheres, Dobson '988 teaches using at least two furnaces for a first and second heat-treatment for the benefit of controlling the furnaces at different temperatures and/or atmospheres, thereby enabling more precise process controls and continuous

processing of the spheres (column 5, lines 9-17; Figure). As Fukumoto '156 teaches performing heat-treatment in a rotary tube furnace, then the suggestion of Dobson '988 to utilize at least two furnaces would suggest to one of ordinary skill in the art at the time of the invention to modify Fukumoto '156 by utilizing at least two rotary tube furnaces for the first and second heat treatments. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Fukumoto '156 by controlling the temperature of the rotary tube furnace to optimize the rate of temperature increase, as suggested by Fisher '347, for the benefit of controlling the burning out of organic substances and preventing contamination of the silica product, and by utilizing a first and a second rotary tube furnace, as suggested by Dobson '988, for the benefit of enabling more precise process controls and continuous processing of the spheres.

15. Regarding claim 14, Fukumoto '156 is silent regarding the silica gel pellets having pores with a size between about 20 Å and about 70 Å, and a pore volume between about 0.3 mL g^{-1} and about 1.1 mL g^{-1}. However, Fukumoto '156 suggests that the physical properties of the gel may be selected, along with processing conditions, based on the desired properties of the product (column 3, lines 56-61; column 4, line 57-column 5, line 6). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of Fukumoto '156, Fisher '347, and Dobson '988 by selecting pore size and pore volume of the silica gel pellets for the benefit of optimizing foaming and properties of the end product.

16. Regarding claim 20, Fukumoto '156, Fisher '347, and Dobson '988 teach the claimed temperatures and rotary tube furnaces as described for claim 19 above.

Fukumoto '156 further teaches holding the silica gel pellets for between about 20 minutes to about 60 minutes while the temperature remains between about 400°C and about 900°C (column 7, lines 14-15) and holding the silica gel pellets for between 20 minutes and about 60 minutes while the temperature remains between about 1050°C and about 1200°C ("Firing usually completes within a short period of 3 to 10 minutes, although longer time is applicable without any adverse effect", column 4, lines 48-50 – wherein the range taught by Fukumoto '156, i.e., 3 minutes or more, overlaps the claimed range. See In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)).

17. Regarding claim 21, Fukumoto '156, Fisher '347, and Dobson '988 teach second rotary tube furnace as described for claim 19 above. Fukumoto '156 further teaches the second temperature, as would be utilized in the second rotary tube furnace for the combination described for claim 19 above, being between about 1100°C and about 1150°C (column 3, line 62-column 4, line 1; column 4, lines 25-29 - wherein the temperature range of Fukumoto '156 overlaps the claimed range. See In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976)).

Response to Arguments

18. Applicant's arguments filed 06-23-2011 have been fully considered but they are not persuasive. Arguments are summarized as follows:

a. The Examiner has not pointed to any teaching in the cited references of a temperature-increasing stage being performed in a rotary tube furnace.

b. New claims 15-21 (and amended claim 14) are distinguishable over Fukumoto '156, Fisher '347, Fukumoto '486, and Dobson '988 because Fukumoto '156 requires forming the silica gel by adding water-insoluble inorganic powder to a silica sol, which is subsequently gelled and dried. The declaration under 37 CFR 1.132 filed 06-23-2011 ("the 2011 Kim Declaration") shows that forming silica gel in this fashion results in a gel that comprises sharp, fractured particles having an irregular shape, as contrasted with the "pellets" recited in Claims 15 and 19.

Response:

a. Fukumoto '156 teaches heat treating in a rotary tube furnace, as described in the rejections above and previously. Firstly, the rejections above are not based solely on Fukumoto '156, as Fisher '347 and Fukumoto '486 are relied upon to teach temperature increasing rates. One of ordinary skill in the art would reasonably understand a step of "firing" to include both temperature ramping and holding stages (as the material being treated is not instantly at top firing temperature), and would reasonably expect that if only a single furnace is described, both stages occur in the single furnace, for purposes of efficiency, cost effectiveness, and material stability. For the combination of Fukumoto '156, Fisher '347, and Fukumoto '486 as proposed above, one of ordinary skill in the art could reasonably envision performing the temperature increasing suggested by Fisher '347 and Fukumoto '486 as well as the temperature holding taught by Fukumoto '156 in the rotary tube furnace taught by Fukumoto '156.

b. The features upon which applicant relies for the basis of both the argument and the 2011 Kim Declaration are not recited in the rejected claims, as claims 15 and 19 do not recite any particular shape of the claimed "pellets". Applicant's specification does not even use the word "pellet", and thus does not provide any special definition limiting the meaning of "pellet". Therefore, the instant claims do not preclude utilization of the silica gel formed by the method of Fukumoto '156. Fukumoto '156 recites that the silica gel has particle sizes ranging from 0.05 to 10 mm (column 3, lines 60-61), which may reasonably be considered to constitute pellets.

19. Applicant's remaining arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erin Snelting whose telephone number is (571)272-7169. The examiner can normally be reached on Monday to Friday 9:00 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Daniels can be reached on (571) 272-2450. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JASON L LAZORCIK/
Primary Examiner, Art Unit 1741

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